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Medication information

A drug education tool developed for older adults changes knowledge, beliefs and risk perceptions about inappropriate benzodiazepine prescriptions in the elderly

Philippe Martin [a,c], Robyn Tamblyn [b], Sara Ahmed [b], Cara Tannenbaum [c,*]

[a] Faculty of Pharmacy, Université de Montréal, Canada
[b] McGill University, Montreal, Quebec, Canada
[c] Institut Universitaire de Gériatrie de Montréal, Université de Montreal, Quebec, Canada

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ABSTRACT

Objective: To develop and test an educational tool for older adults that increases risk perception about benzodiazepines through knowledge acquisition and change in beliefs.
Methods: A written educational tool was mailed to 144 benzodiazepine consumers aged ≥65 years recruited from community pharmacies. Knowledge and beliefs about inappropriate prescriptions were queried prior to and 1-week after the intervention. Primary outcome was a change in risk perception. Explanatory variables were a change in knowledge and beliefs about medications. Self-efficacy for tapering and intent to discuss discontinuation were also measured.
Results: Post-intervention, 65 (45.1%) participants perceived increased risk. Increased risk perceptions were explained by better knowledge acquisition (mean change score 0.9, 95% CI (0.5, 1.3)), and a change in beliefs (BMQ differential mean change score −5.03, 95% CI (−6.4, −3.6)), suggesting elicitation of cognitive dissonance. Self-efficacy for tapering, (mean change score 31.2, 95% CI (17.9, 44.6)), and intent to discuss discontinuation of benzodiazepine with a doctor (83.1% vs 44.3%, $p < 0.001$) were higher among participants who perceived increased risk.
Conclusion: Risk perception surrounding inappropriate prescriptions can be altered through direct delivery of an educational tool to aging consumers.
Practice implications: Patients should be targeted directly with information to catalyze discontinuation of inappropriate prescriptions.

1. Background

Medication safety in the elderly population represents a unique challenge. Older adults are at increased risk of drug side effects, drug-drug interactions and adverse events due to age-related changes and associated disease [1,2]. The 2012 updated Beers Criteria for Potentially Inappropriate Medication Use in Older Adults lists all drugs-to-avoid in the elderly to reduce the risk of drug-related adverse events [3,4]. All benzodiazepine sedative-hypnotic drugs used for the treatment of anxiety and insomnia feature on this list due to an excessive risk of delirium, falls, fractures and motor vehicle accident [5].

With every update to the Beers criteria, significant efforts are made to inform and educate relevant parties to try and implement safer prescribing practices. We sought to develop an educational intervention to inform consumers directly about the risk of benzodiazepine drugs. We chose benzodiazepine drugs because qualitative research suggests that chronic users develop a psychological dependence to benzodiazepines, attributing them qualities that extend beyond their ordinary capacity [6]. Most consumers deny or minimize side effects while expressing subtle reluctance to outright refusal for being left suffering without these medications [6]. For these reasons physicians often express reticence for insisting on benzodiazepine discontinuation for fear of upsetting the doctor-patient relationship or because they believe that the patient tolerates the medication with minimal side effects [7].

The objective of this study was to develop and test an educational tool targeted directly to older consumers on the risks associated with benzodiazepine use in the geriatric population. By applying constructivist learning theory to the development of the educational intervention, we aimed to evaluate the potential of this tool for increasing the patient's risk perception by eliciting cognitive dissonance through knowledge acquisition and belief alteration. We hypothesized that improvements in patient

* Corresponding author at: Institut Universitaire de Gériatrie de Montréal, Faculties of Pharmacy and Medicine, Université de Montreal, 4545 Queen Mary Road Montreal, QC H3W 1W5, Canada. Tel.: +1 514 340 3540x2526; fax: +1 514 340 2117.
E-mail address: cara.tannenbaum@umontreal.ca (C. Tannenbaum).

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knowledge, beliefs and perceived medication risk would lead to greater motivation for initiating discussions about drug discontinuation with a doctor or pharmacist and greater self-efficacy for tapering benzodiazepine use.

2. Methods

A quasi-experimental study was conducted among a cohort of chronic benzodiazepine users aged 65 years and older in Montreal, Canada. Participants were randomized to immediately receive an educational intervention to reduce inappropriate prescriptions or to a six-month wait-list group. The current analysis presents interim results on short-term changes in risk perceptions about benzodiazepines due to the intervention. The study was approved by the Institut Universitaire de Gériatrie de Montréal Ethics Committee in Montreal, Quebec, Canada.

2.1. Participants

The study population included community-dwelling men and women aged 65 years and older, consuming at least five prescription medications including a benzodiazepine dispensed for at least three consecutive months. Exclusion criteria were a diagnosis of severe mental illness or dementia ascertained by the presence of an active prescription for any antipsychotic medication and/or a cholinesterase inhibitor or memantine. Participants unable to communicate in French and/or English or showing evidence of significant cognitive impairment (score under 21 [8] on the MOCA (Montreal Cognitive Assessment)) were also excluded.

2.1.1. Recruitment

Participants were recruited from community pharmacies in the greater Montreal area. Pharmacists identified eligible patients from their databases and invited them to enroll in the study through personalized mailed invitations, referring them to the study coordinator. A telephone follow up from the pharmacist (or delegate) aimed to ascertain interest in the study from eligible participants who had not spontaneously contacted the coordinator. An appointment was made with the study coordinator at participant's residence for those who provided permission to be contacted for the study. Signed consent was obtained from individuals who met study criteria after baseline cognitive and health status screening.

2.2. The educational intervention

2.2.1. Theory and development of the intervention

Social cognitive theory, which consists of health promotion through social cognitive means, guided the development of the intervention [9]. The specific learning model that was applied was constructivist learning. Constructivist learning theory aims to promote active learning through creation of knowledge that seeks to make sense out of the material presented. The goal of this approach is to create an environment where the learner can interact with academic material, fostering their own selecting, organizing and information integrating processes [10]. Such theories have already proven successful in other health promotion interventions such as in educational materials for smoking cessation [11].

A critical component of constructivist learning theory is elicitation of cognitive dissonance [12]. Cognitive dissonance occurs when a person's preconceived notions about the self and the world clash with new knowledge acquisition; the discrepancy that is evoked results in a state of tension known as cognitive dissonance [12]. Our educational intervention for reducing benzodiazepine use was developed to create cognitive dissonance by soliciting an aversive motivational state in recipients by confronting two inconsistent cognitions on benzodiazepine use. The theory holds that as the experience of dissonance is unpleasant, the individual will be motivated to remove the pressure caused by this conflict by altering one of these perceptions to achieve consonance [12]. For instance, if an individual previously believed that benzodiazepines were safe, the threatening content of the tool challenges this belief by providing information that benzodiazepines incur several harmful risks, thus putting into question whether consumption should be continued [13,14] We also incorporated social comparison theory into the content of the intervention to reassure participants about their newfound uncertainty regarding benzodiazepine use. Social comparison states that: "people evaluate their opinions and abilities by comparison respectively with the opinions and abilities of others"[15]. It thus consists of comparing oneself with others in order to evaluate or to enhance some aspects of the self [16]. Here, the evaluation of the ability or inability to do a specific action relies on the success of a proxy performer. The efficacy of this theory depends on whether the comparer assimilates or contrasts him/herself to others [17]. Comparability with a peer champion's narrative and previous agreement with the peer's views are important factors for the comparison to work [16]. A self-assessment component was also introduced, which aimed to promote insight about potential misinformation or beliefs held about benzodiazepine use by providing feedback on incorrect assumptions [18,19].

Textual content of the intervention was based on a systematic review of the evidence as well as guidelines concerning the use of benzodiazepines in the elderly. A geriatrician and graduate student drafted the initial content of the tool, which was then validated by a panel of colleagues with expertise in geriatric pharmacy and reviewed by a health librarian to ensure that the wording met standards for patient literacy at the Grade 6 level. The tool was developed in English, and backward and forward translated into French.

2.2.2. Components of the intervention

The cover page of the brochure states "You May Be At Risk" with a picture of a pillbox with several medications in it, followed by "You are currently taking (name of the patient's benzodiazepine)". The first page of the intervention is entitled "Test Your Knowledge" and consists of four true or false questions on the use of the benzodiazepines. The second page lists the correct answers. Elements of constructivist learning theory are incorporated into the answers to create cognitive dissonance and challenge the patient's beliefs for each incorrect answer. The third page incorporates self-assessment and education about potential inappropriate use, side effects, drug-drug interactions and information about physiologic changes that occur with age that affect drug metabolism. The fourth and fifth pages present evidence-based risks associated with benzodiazepine use in the elderly and suggestions for equally or more effective therapeutic substitutes. The sixth page describes a case scenario highlighting one woman's success at weaning herself off benzodiazepines. The last page outlines a simple 21-week tapering program. The reader is encouraged on four occasions and is warned in large, red lettering to "Please Consult your Doctor or Pharmacist Before Stopping Any Medication."

2.2.3. Acceptability of the intervention

The tool was field-tested with a convenience sample of older adults to determine the readability and comprehension of the information. Six focus-groups ($n = 60$ adults) were conducted. Based on the focus group discussions, the wording, ordering of the material and visual presentation of the intervention was changed

in an iterative process until acceptability was reached. The final educational intervention consisted of a seven-page letter-size paper brochure written in 14-point font. The educational tool was mailed to the study participants within six months of the initial assessment.

2.3. Study outcomes

2.3.1. Primary outcomes

The primary outcome was a self-reported change in perception of risk associated with benzodiazepine use one week post-intervention. Participants were asked whether they perceived the same, increased, or no risk from consumption of their benzodiazepine following the intervention. A common idea in models of risk perception is that risk is perceived from two dimensions: the first being knowledge about the risk, and the second, beliefs about that risk [20]. To explain changes in perception of risk we therefore measured changes in knowledge and beliefs about medications as a mechanism through which cognitive dissonance could occur.

Change in knowledge was measured by comparing the pre-intervention and post-intervention answers from the four-item true or false questions listed in the "Test Your Knowledge" section of the questionnaire. The first statement on the safety of long-term benzodiazepine was "(Example: Ativan®)...is a mild tranquilizer that is safe when taken for long periods of time". The second statement focused on side effects and was worded, "The dose of Ativan® that I am taking causes no side effects." The third statement on withdrawal was phrased, "Without Ativan® I will be unable to sleep or will experience unwanted anxiety," and the fourth statement on alternative treatment options reads: "Ativan® is the best available option to treat my symptoms".

Change in beliefs was measured by comparing the pre- and post-intervention total scores on the specific section of the beliefs about medicines questionnaire (BMQ-Specific) adapted for benzodiazepines [21,22]. The rationale for choosing the BMQ-Specific instrument to measure beliefs relates to its ability to isolate and score participants' beliefs (second dimension of risk perception) about a specific medication, both in terms of the necessity of taking their prescription (Specific-Necessity) and the dangers of this same prescription, such as long term toxicity, side-effects and dependence (Specific-Concerns). The BMQ-specific consists of two five-items factors belonging to each sub-score. Participants indicate their degree of agreement with each statement on a 5 point Likert scale (where 1 = strongly disagree through 5 = strongly agree). Scores are then summed into their respective sub-category (5–25 scale) with higher scores indicating stronger beliefs. A necessity-concerns differential can also be calculated by subtracting the concern sub-score from the necessity sub-score. This differential can be thought of as the cost benefit analysis for each patient, where costs (concerns) are weighed against perceived benefits (necessity beliefs) [21,22]. A negative change in BMQ-differential score thus indicates a greater perception of risk.

2.3.2. Secondary outcomes

Two secondary outcomes were selected to measure anticipated behaviors potentially resulting from a change in risk perception: self-efficacy for tapering benzodiazepines and the intent to discuss benzodiazepine discontinuation with a doctor or pharmacist. The behavior motivation hypothesis was used to understand the drivers and consequences of risk perception. This hypothesis describes the determinants of risk perception and their effects on behavior change, and is endorsed by most models of health behavior [23]. Perception of risk has been shown to be positively related to preventive health behavior when expectations of success in dealing with the risk are acceptable, and when recommendations for preventive behavior are presented as effective [24]. Self-efficacy for tapering benzodiazepines was measured pre- and post-intervention on the Medication Reduction Self-efficacy scale, which allows the respondent to rate on a scale of 0 to 100 their degree of confidence for tapering and discontinuing benzodiazepines [25].

In order to measure anticipated behavior as a function of the participant's willingness to empower themselves in health-related decisions following the intervention, participants were asked to indicate (yes/no) post intervention: if they had spoken to friends and family about the intervention, and if they had spoken to or intended to discuss medication discontinuation with their doctor and/or pharmacist. These intentions were considered as a preliminary measure of preventive health behavior. Finally, initial reaction to the questionnaire and whether they had read it more than once was also collected.

Outcomes were measured at baseline and one week following receipt of the intervention. At baseline, questionnaires were completed at the participants' homes during an interview with the research coordinator. Follow up was by telephone interview with the same coordinator. Self-reported socio-demographic variables, health status variables and prescription details were collected at baseline.

2.4. Statistical analysis

Participant characteristics were summarized using means with standard deviations for continuous data and percentages for categorical data. The number of participants reporting increased risk perceptions one week after the intervention was reported as a proportion of all participants. To examine potential differences in the baseline characteristics of participants who perceived increased risk versus those who did not, group comparisons were conducted. There were few missing baseline data ($n = 0$–5 per variable), which were replaced by the mean group value.

To determine whether a change in knowledge or beliefs explained changes in risk perception as a result of receiving the educational intervention, changes in knowledge and beliefs from pre- to post-intervention were computed for each individual, as well as within and between groups of individuals who reported increased risk perceptions versus those who did not. Correct knowledge pre- and post-intervention was reported as the proportion of individuals endorsing the correct answer for each question. A sub-analysis among participants with potential for change, denoted by CAIA, or Change in the Answer from an Incorrect Answer, was also conducted to determine change in knowledge among participants who initially answered a question incorrectly, but subsequently changed to the correct answer at 1-week follow-up. Participants with correct answers at both time-points were thus excluded from the CAIA measure, as there was no potential for cognitive dissonance. An overall score for knowledge was computed as the sum of correct answers (0–4 range). A change in belief was measured by comparing the BMQ-specific-necessity score, specific-concern score and necessity-concern differentials both within and between the increased risk and no increased risk group. Participants who had evidence of both a change in knowledge and a change in beliefs were denoted as having experienced cognitive dissonance.

Self-efficacy scores for discontinuing benzodiazepines were compared both within and between RISK groups from baseline to post intervention, as were responses to the query about self-efficacy for tapering benzodiazepines. Participants with missing data for any of the BMQ-specific variables ($n = 3$) or the self-efficacy variables ($n = 7$–8) were withdrawn from these analyses. In order to determine the increased likelihood of anticipated preventive behaviors according to risk perception, the odds of

endorsing a behavior were regressed against risk perception using univariate logistic regression. Missing data were replaced by a negative answer for the latter analyses,

A chi-square test was used when comparing groups while McNemar's test was used to examine changes within groups from baseline to post-intervention for categorical variables. Independent *t*-tests were used to compare groups while paired *t*-tests were used to examine changes within groups from baseline to post-intervention for continuous variables. The statistical significance for all analyses was set at $p < 0.05$ (two-sided). SPSS Version 20.0 (SPSS Inc. Chicago, IL, USA) was used for all analyses.

3. Results

3.1. Recruitment

Participants were recruited from 12 pharmacies. The response rate to the mailed invitation to enroll in the study among eligible participants identified by their pharmacists was 15%. A total of 144 participants who received the educational intervention are included in this analysis.

3.2. Baseline characteristics

Table 1 shows demographic, general health status and prescription-related characteristics of the entire cohort at baseline. Participants were mostly female (73%), had an average age of 75, and the majority (83%) had no formal college or university education. Half of all participants had previously attempted benzodiazepine discontinuation, 25% of whom had successfully weaned off the drug at some point.

3.3. Change in risk perceptions

Post-intervention, 45.1% ($n = 65$) of participants reported increased perceived risk from consumption of benzodiazepines. There were no statistical differences in baseline characteristics between individuals perceiving an increased risk (RISK) and those with no perceptions of increased risk (NO RISK), except for a trend showing a shorter duration of benzodiazepine use among the RISK group ($p = 0.08$) (Table 1).

3.4. Change in knowledge

Knowledge about benzodiazepines was similar between groups at baseline. Changes in knowledge both within and between risk groups are described in Table 2. Eighty percent (52/65) of participants in the RISK group changed an answer from incorrect to correct on at least one knowledge question from pre- to post-intervention compared to only 41% (33/79) in the NO RISK group. The RISK group demonstrated a significantly higher proportion of correct answers post-intervention on the safety, side effects and alternatives questions compared to the NO RISK group ($p < 0.001$). Only participants in the RISK group who had the potential for knowledge acquisition showed a statistically significant increase on the overall knowledge score (mean change score 1.77 SD (1.3)). The change in overall score was significantly greater among these individuals in the RISK group post-intervention compared to the NO RISK group (mean change score 0.91 95% CI (0.5, 1.3)).

3.5. Changes in beliefs

Beliefs about benzodiazepines were similar between groups at baseline. Tables 3a and 3b show changes in beliefs about the necessity, perceived negative consequences, and risk-benefit ratio of benzodiazepine use. Eighty-three percent (54/65) of participants in the RISK group had an improved BMQ-differential score (negative change) from baseline to follow-up, indicating increased risk perception, compared to 27% (31/79) of participants in the NO RISK group. The RISK group showed statistically significant group differences across all three of these BMQ outcomes ($p < 0.001$) while no significant group changes were detected in the NO RISK group. Post-intervention, the RISK group reported significantly lower scores on the necessity subscale (mean change score −1.31, 95% CI (−2.3, −0.4)), significantly higher scores on the concerns subscale (mean change score 3.72, 95% CI (2.9, 4.5)) and a statistically greater necessity-concerns differential (mean change score −5.03, 95% CI (−6.4, −3.6)), compared to the NO RISK group.

3.6. Frequency of cognitive dissonance

According to an operational definition of cognitive dissonance predicated upon a change in knowledge and a change in beliefs about benzodiazepine consumption due to receipt of the intervention, 44/65 (68%) of participants in the RISK group and 19/79 (24%) of participants in the NO RISK group experienced cognitive dissonance. The experience of cognitive dissonance was associated with a six-fold higher likelihood of patients reporting increased risk perception about their benzodiazepine prescription (OR = 6.61 95%CI (3.2, 13.8)).

Table 1
Descriptive demographic and health status characteristics at baseline. Values are mean, standard deviation (SD) or number (%).

Characteristics	All ($N = 144$)	RISK[a] ($N = 65$)	NO RISK[a] ($N = 79$)	*p*-Value
Female, *n* (%)	105 (73%)	47 (72%)	58 (73%)	0.88
Age (years), mean (SD)	74.9 (6.5)	75.3 (6.1)	74.6 (6.8)	0.52
College or University education, *n* (%)	25 (17%)	11 (17%)	14 (18%)	0.90
Living alone, *n* (%)	69 (48%)	29 (45%)	40 (51%)	0.47
MOCA[b], mean (SD)	25.4 (2.4)	25.4 (2.4)	25.4 (2.5)	0.94
General health status (fair to bad), *n* (%)	43 (30%)	19 (29%)	24 (30%)	0.88
Comorbidities, mean (SD)	7.0 (2.5)	6.8 (2.3)	7.1 (2.6)	0.62
Indication for taking Benzodiazepines, *n* (%)				
Insomnia	94 (65%)	42 (65%)	52 (66%)	0.88
Anxiety	64 (44%)	27 (42%)	37 (47%)	0.52
Duration of benzodiazepine use (years), mean (SD)	10.5 (8.2)	9.2 (7.8)	11.6 (8.4)	0.08
Previous attempts at cessation, *n* (%)	80 (56%)	32 (49%)	48 (61%)	0.24
Successful attempts, *n* (%)	20 (25%)	5 (16%)	15 (31%)	0.11

Independent sample *t*-test for continuous variables, chi square for categorical variables.
* Level of significance, $p < 0.05$ [28].
[a] RISK: Perceived an increased risk vs NO RISK: perceived no risk or same risk as pre-intervention.
[b] MOCA: The Montreal Cognitive Assessment (scale 0–30)

Table 2
Effect of the educational tool on knowledge. Values are number (%), mean or standard deviation (SD).

Variables		Within groups at one week						Between groups at week 1			
Questions		Group	Baseline	*p*-Value (between groups)	Post-intervention	CAIA[b], n (%)	*p*-Value (CAIA[b)]	Difference (%)	*p*-Value	Difference in CAIA[b] (%)	*p*-Value (CAIA[b)]
1 – safety, *n*		RISK[a] (*n* = 65)	23 (35.4%)	0.75	56 (86.2%)*	33/42 (78.6%)*	<0.001	34.3*	<0.001	39.9*	<0.001
(% with correct answer)		NO RISK[a] (*n* = 79)	26 (32.9%)		41 (51.9%)*	24/62 (38.7%)*	0.014				
2 – side-effects, *n*		RISK[a] (*n* = 65)	4 (6.2%)	0.51[c]	28 (43.1%)*	26/63 (41.3%)*	<0.001	30.4*	<0.001	30.5*	<0.001
(% with correct answer)		NO RISK[a] (*n* = 79)	3 (3.8%)		10 (12.7%)*	8/77 (10.4%)*	0.039				
3 – withdrawal, *n*		RISK[a] (*n* = 65)	13 (20.0%)	0.69	32 (49.2%)*	21/55 (38.2%)*	<0.001	11.6	0.13	11.7	0.17
(% with correct answer)		NO RISK[a] (*n* = 79)	18 (22.8%)		29 (36.7%)*	18/68 (26.5%)*	0.043				
4 – alternatives, *n*		RISK[a] (*n* = 65)	7 (10.8%)	0.17	41 (63.1%)*	35/60 (58.3%)*	<0.001	29.8*	<0.001	32.6*	<0.001
(% with correct answer)		NO RISK[a] (*n* = 79)	15 (19.0%)		27 (34.2%)*	18/70 (25.7%)*	0.023				
Test score	Group	Baseline	*p*-Value (between groups)	Post-intervention	CAIA[b], Mean (SD)	*p*-Value (CAIA[b)]	Difference (95% CI)	*p*-Value	CAIA[b] (95% CI)	*p*-Value (CAIA[b)]	
Overall (/4), mean (SD)	RISK[a] (*n* = 65)	0.72 (0.9)	0.69	2.42 (1.3)	1.77 (.1.3)*	<0.001	1.06 (.6, 1.5)*	<0.001	0.91 (.5, 1.3)*	<0.001	
	NO RISK[a] (*n* = 79)	0.79 (0.9)		1.35 (1.3)	0.86 (1.10)	0.682					

Within groups: Paired *t*-test for continuous Variables, McNemar's test for categorical variables. Between groups: Independent sample *t*-test for continuous variables, chi square for categorical variables.
[a] RISK: perceived an increased risk vs NO RISK: perceived no risk or same as pre-intervention.
[b] CAIA: change among those with an incorrect answer (excludes participants with correct answers at both time-points).
[c] Wilcoxon non-parametric test.
* Level of significance, $p < 0.05$ [28].

3.7. Change in self-efficacy for tapering benzodiazepines

The RISK group reported significantly greater improvements in self-efficacy for discontinuing benzodiazepines following the intervention (mean change score 31.24 95% CI (17.9, 44.6)) compared to the NO RISK group. The added benefit of the tapering protocol on self-efficacy scores for discontinuing benzodiazepines within the RISK group was an extra 6.05 points on the self-efficacy scale, 95% CI (3.0, 9.1). No statistically significant differences in self-efficacy were found in the NO RISK group.

3.8. Change in health behaviors aimed at discontinuing benzodiazepine use

Fig. 1 shows correlates and anticipated behaviors associated with an increased risk perception post-intervention. The RISK group reported a significantly higher likelihood of reading the tool more than once (OR = 8.34 95% CI (3.9, 17.9)), intention to discuss the intervention with family and friends (OR = 2.65 95% CI (1.3, 5.5)), and intention to discuss discontinuation with a physician (OR = 6.17 95% CI (2.8, 13.5)), or pharmacist (OR = 6.29 95% CI (2.8, 14.3)), compared to the NO RISK group.

4. Discussion and conclusion

Findings from this study indicate that a personalized patient-targeted benzodiazepine educational intervention delivered directly to the individual consumer via written material was effective in changing medication risk perceptions in 45% of older chronic users. Heightened risk perception was explained by significant changes in knowledge and beliefs about benzodiazepines due to receipt of the tool. Our study suggests that participants in whom the intervention elicited changes in knowledge and beliefs may have experienced cognitive dissonance as the mechanism underlying increased risk perception. Participants with increased risk perception reported greater self-efficacy for tapering benzodiazepines, and marked intent to engage in preventive health behaviors by discussing medication safety with a health professional.

The participants in this study are representative of other older chronic benzodiazepine users reported in previous studies, with a mean age of 77 years and a 10-year average duration of benzodiazepine use [6,9,26]. Neither age nor duration of use were significant predictors of the ability to perceive increased risk, suggesting that our intervention is effective in a wide range of individuals regardless of entrenched habits or beliefs. To the best of our knowledge, this study is the first to demonstrate a positive effect of targeting older adults directly about medication appropriateness, thereby bypassing health professionals and engaging patients as drivers of change to catalyze physicians and/or pharmacists in a collaborative effort to reduce medication-related risk.

4.1.1. Mechanisms underlying the change in risk perception

The educational intervention developed in the current study aimed to change risk perception by creating cognitive dissonance

Table 3a
Change in beliefs associated with risk perception post-intervention. Values are mean or standard deviation (SD).

Variables	Within groups at one week					Between groups at week 1	
	Group	Baseline	Post-intervention	Difference (95% CI)	*p*-Value	Difference (95% CI)	*p*-Value
Belief about necessity of the drug[b], Mean (SD)	RISK[a]	14.22 (3.3)	12.60 (2.4)	−1.62 (−2.5, −0.8)*	<0.001	−1.31 (−2.3, −0.4)*	0.007
	NO RISK[a]	13.97 (3.7)	13.91 (3.3)	−0.06 (−0.9, 0.8)	0.883		
Belief about side-effects of the drug[b], Mean (SD)	RISK[a]	13.40 (2.3)	16.14 (2.5)	2.75 (2.0, 3.5)*	<0.001	3.72 (2.9, 4.5)*	<0.001
	NO RISK[a]	12.71 (2.1)	12.42 (2.3)	−0.28 (−0.8, 0.3)	0.296		
Necessity Concern[c] differential, Mean (SD)	RISK[a]	0.83 (4.3)	−3.54 (3.8)	−4.37 (−5.6, −3.1)*	<0.001	−5.03 (−6.4, −3.6)*	<0.001
	NO RISK[a]	1.27 (4.6)	1.49 (4.4)	0.22 (−.9, 1.3)	0.697		
Self-efficacy for discontinuation of drug[d], Mean (SD)	RISK[a]	32.42 (33.4)	68.71 (36.6)	36.29 (24.8, 47.8)*	<0.001	31.24 (17.9, 44.6)*	<0.001
	NO RISK[a]	31.9 (35.1)	37.47 (42.4)	5.56 (−4.5, 15.6)	0.276		

Table 3b
Added impact of tapering tool on self-efficacy for discontinuation post-intervention.

Variables	Group	On their own	With Tapering tool	Added value of tool (95% CI)	*p*-Value	Difference (95% CI)	*p*-Value
Self-efficacy for discontinuation of drug[d], mean (SD)	RISK[a]	68.71 (36.6)	74.80 (32.3)	6.05 (3.0, 9.1)*	<0.001	32.66 (20.1, 45.2)*	<0.001
	NO RISK[a]	40.68 (42.4)	42.09 (41.6)	1.42 (−1.7, 4.5)	0.368		

Within groups: paired *t*-test, between groups: independent sample *t*-test.
[a] RISK: perceived an increased risk vs NO RISK: perceived no risk or same as pre-intervention.
[b] Specific-necessity and concern scales range from 5 to 25, higher scores indicating more agreement with the concept.
[c] "Benefit-risk ratio", necessity – concern scale, ranges from −20 to 20.
[d] Scaled from 0 to 100.
* Level of significance, $p < 0.05$ [28].

through self-assessment, new knowledge provision, and social comparison. We hypothesized that a change in knowledge and beliefs would create cognitive dissonance, thus leading to a change in risk perception. Unfortunately our study was not designed to ascertain cognitive dissonance directly. By operationalizing cognitive dissonance as a change in both knowledge and beliefs, we were able to show that individuals who experienced cognitive dissonance were six times more likely to report increased risk, thus supporting the application of constructivist learning theory. Interestingly, the intervention was only effective in changing risk perceptions in 45% of participants. This may be explained by the fact that many benzodiazepine users are psychologically dependent on their medication. This psychological dependence likely creates compelling opposition to new learning and denial of risk, possibly explaining the lack of significance across all components of the tool for the 55% of participants who reported no increase in risk perception. Our findings are consistent with another study on medication discontinuation where the majority of participants tended to reject the first suggestion of discontinuation [6], as well as with studies on breast cancer risk by Alexander et al. where only 50% of participants changed risk perceptions when presented with an educational intervention [27].

Baseline knowledge was similar across all participants, with the greatest knowledge change occurring in participants who perceived increased risk. Participants who correctly answered the knowledge questions post-intervention were eight times more likely to reread the tool (OR = 8.34, 95% CI (3.9, 17.9)) than those who perceived no increased risk suggesting that rereading the intervention may be associated with better learning.

4.1.2. Preventive health behavior

Our results also showed a significant difference between groups on self-reported intent to discuss medication discontinuation with a family member, pharmacist or physician. These measures signify readiness to engage in preventive health behaviors. Whether or not these intentions translate into action remains to be determined.

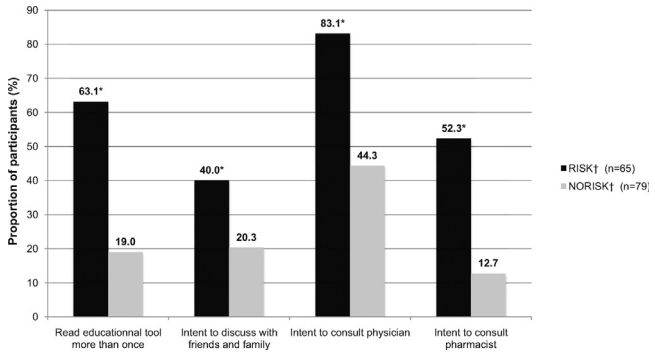

Fig. 1. Correlates and anticipated behaviors associated with risk perception. † RISK: perceived an increased risk vs NO RISK: perceived no risk or same as pre-intervention. *$p < 0.01$ for difference between groups using chi-square.

4.1.3. Strengths and limitations

The major strength of this study was systematic measurement of knowledge, beliefs and risk perceptions. Missing data was imputed to reflect a worst-case scenario, and at best underestimated the impact of the intervention. Few validated instruments exist to reliably measure benzodiazepine-related knowledge, beliefs and behaviors. Although the BMQ-Specific questionnaire has been previously tested, the benzodiazepine-related knowledge questions were not. Similarly, risk perception was measured with a single self-reported item and not a full instrument, and the elicitation of cognitive dissonance was assumed rather than measured directly. Finally, this study was conducted in community pharmacies and thus is not generalizable to frailer patients living in health care facilities or long-term care.

4.2. Conclusion

In conclusion, a home-based educational program consisting of a document mailed to participants demonstrated significant effects on medication knowledge, beliefs and risk perception in a cohort of older benzodiazepine users. By changing knowledge and increasing perceived risk, consumer-targeted drug information elicited a desire among many older adults to discuss medication safety with their health care providers. The results of an ongoing randomized trial will demonstrate whether these changes wrought by the educational intervention are sufficient to result in discontinuation of inappropriate prescriptions.

4.3. Practice implications

The aging consumer may be an under-utilized catalyst of change for reducing potentially inappropriate prescriptions.

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Conflict of interest

None.

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